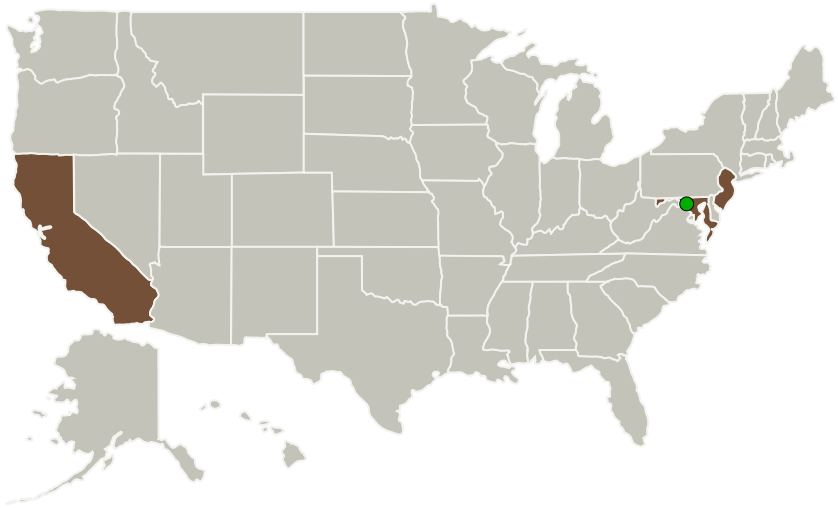
RUSH, Phase I

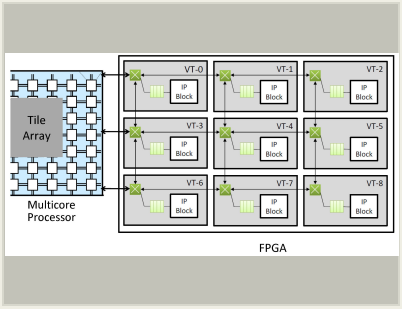
Completed Technology Project (2013 - 2014)

Project Introduction

Space presents a challenging environment for computing. Extended development times and radiation tolerance requirements leave hardware performance a decade or more behind the terrestrial state-of-the-art at the time of deployment. Additionally, once deployed, hardware changes are impractical, encouraging a trend towards increased software programmability. At the same time, topside pressure from application advancements is forcing space-based platforms to improve throughput and latency while reducing power consumption. A popular approach to addressing the tension between these requirements is the heterogeneous processing architecture. By providing multiple hardware tools that optimally support a subset of the anticipated workload, a heterogeneous architecture can offer performance and power solutions to the application developer. However, programming these systems is extremely challenging due to variations in toolsets and data sharing interfaces. As a result, data sharing and dynamic workload scheduling across heterogeneous architectures are often suboptimal and hindered by poor scalability. In this research and development effort, we study the feasibility of unifying a heterogeneous processing platform a unique programming model This platform is called the Assimilation Dynamic Network (ADN). The ADN employs a mesh network and virtual tiles on FPGAs and scalable multicore processors to create a cleaner and innovative programming model.

Primary U.S. Work Locations and Key Partners





RUSH

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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
MaXentric Technologies, LLC	Lead Organization	Industry	Fort Lee, New Jersey
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
University of California-San Diego(UCSD)	Supporting Organization	Academia	La Jolla, California

Primary U.S. Work Locations	
California	Maryland
New Jersey	

Project Transitions

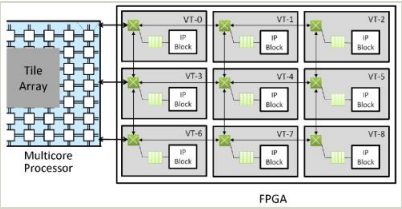
May 2013: Project Start

May 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140717)*

Images



Project Image
RUSH
(https://techport.nasa.gov/image/133622)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MaXentric Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

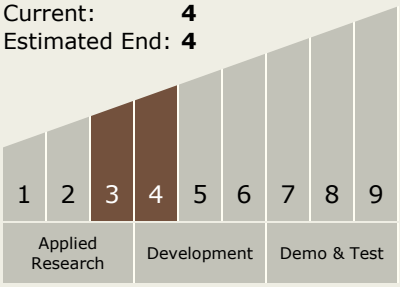
Carlos Torrez

Principal Investigator:

Brandon Beresini

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.5 High Performance Field Programmable Gate Arrays

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System